

Claims

1 1. A method for routing messages within a network,  
2 said method comprising:

3 receiving a message; and

4 routing said message to one or more clients of  
5 said network, said routing being based on data content  
6 of said message irrespective of any destination  
7 information that may be within said message, and being  
8 resilient to router or link failure within said  
9 network.

1 2. The method of claim 1, wherein said network  
2 comprises a publish/subscribe system supporting content-  
3 based subscription, said one or more clients comprise  
4 subscribers, and wherein said routing comprises delivering  
5 said message to all subscribers requesting a uniform  
6 delivery quality of service or if unable to deliver said  
7 message to all of said subscribers requesting uniform  
8 delivery, delivering said message to none of said  
9 subscribers requesting uniform delivery.

1 3. The method of claim 2, wherein said delivering  
2 said message to all subscribers requesting uniform delivery  
3 comprises delivering said message to all subscribers  
4 requesting uniform delivery notwithstanding failure at one  
5 or more routers or links of said network, said delivering  
6 comprising storing said message to persistent storage at a  
7 logging node of said network prior to providing said message  
8 to said subscribers requesting uniform delivery.

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1 The method of claim 1, wherein said routing  
2 comprises logging said message at at least one logging node  
3 within said network before delivering said message to said  
4 one or more clients of said network, said logging comprising  
5 storing said message in persistent storage.

1 5. The method of claim 4, further comprising  
2 subsequent to said logging of said message, sending a  
3 logging acknowledgment to at least one router of said  
4 network routing said message, and upon receipt of said  
5 logging acknowledgment at said at least one router,  
6 delivering said message to a client thereof, said client  
7 requiring uniform delivery and comprising one client of said  
8 one or more clients.

1 6. The method of claim 5, further comprising  
2 buffering said message at said at least one router of said  
3 network routing said message, said buffering occurring prior  
4 to said storing of said message at said persistent storage  
5 and when passing said message through said at least one  
6 router to said at least one logging node.

1 7. The method of claim 5, wherein said network  
2 comprises a plurality of routers coupled together, one of  
3 said routers comprising said logging node having said  
4 persistent storage associated therewith, said logging  
5 comprising employing said logging node having said  
6 persistent storage associated therewith to store said  
7 message and to thereafter send said logging acknowledgment  
8 back to each router of said network responsible for routing  
9 said message.

1           8.    The method of claim 1, wherein said network  
2 comprises a spanning tree and wherein said method further  
3 comprises providing a logging node within said spanning tree  
4 for logging said message to persistent storage during  
5 routing of said message to said one or more clients of said  
6 network.

1           9.    The method of claim 8, wherein said routing  
2 comprises employing said logging of said message to  
3 persistent storage to ensure a uniform delivery quality of  
4 service of said message to said one or more clients of said  
5 network notwithstanding failure of one or more routers or  
6 links within said network.

1           10.   The method of claim 1, wherein said network  
2 comprises a spanning tree having a plurality of routers,  
3 said method further comprising detecting failure of a router  
4 within said tree before completing routing of said message  
5 to said one or more clients of said network, reconfiguring  
6 said tree to replace said failed router with a new router,  
7 and automatically generating a request for retransmission of  
8 said message.

1           11.   The method of claim 10, further comprising prior  
2 to said detecting of said failure, logging said message  
3 within persistent storage of said network and issuing a  
4 logging acknowledgment confirming storage of said message to  
5 at least one router of said tree through which said message  
6 is routed to said one or more clients.

1 12. The method of claim 10, wherein said automatically  
2 generating said request for retransmission of said message  
3 occurs if said new router detects from one or more of its  
4 child routers a logging number associated with said message,  
5 said logging number having been received in said logging  
6 acknowledgment confirming storage of said message.

C 1 ~~Sub 13~~ 13. The method of claim 1, wherein said routing  
2 further comprises determining within said network whether  
3 said message comprises a duplicate message to said one or  
4 more clients of said network, and if so, aborting said  
5 duplicate message such that said message is delivered to  
6 said one or more clients at most once.

Sub 14 14. The method of claim 1, further comprising  
2 automatically informing a sender of said message when the  
3 message has been lost within the network to allow the sender  
4 to retransmit said message for routing to said one or more  
5 clients of said network so that said message is delivered at  
6 least once to said one or more clients.



1 16. A method for routing messages within a routing  
2 network, said method comprising:

3 receiving a message;

4 logging the message to persistent storage within  
5 the routing network; and

6 after said logging, delivering said message to one  
7 or more clients of said network, wherein said logging  
8 to persistent storage prior to delivery of said message  
9 to said one or more clients of said network provides  
10 resiliency to said routing notwithstanding router or  
11 link failure within said network.

1 17. The method of claim 16, wherein said logging  
2 comprises storing said message in said persistent storage at  
3 a logging node within said routing network before said  
4 delivery of said message to said one or more clients of said  
5 network.

1 18. The method of claim 17, further comprising sending  
2 a logging acknowledgment to at least one router of said  
3 network routing said message after said logging of said  
4 message to said persistent storage, and upon receipt of said  
5 logging acknowledgment at said at least one router of said  
6 network routing said message, delivering said message to a  
7 client thereof, said client thereof requiring uniform  
8 delivery and comprising one client of said one or more  
9 clients.

1 19. The method of claim 16, wherein said network  
2 comprises a spanning tree and wherein said method further  
3 comprises providing a logging node within said spanning tree  
4 for said logging of said message to persistent storage  
5 during routing of said message to said one or more clients  
6 of said network.

1 20. The method of claim 19, wherein said routing  
2 comprises employing said logging of said message to  
3 persistent storage to ensure a uniform delivery quality of  
4 service of said message to said one or more clients of said  
5 network notwithstanding failure of one or more routers or  
6 links within said network.

1 21. The method of claim 16, wherein said routing  
2 network comprises a spanning tree having a plurality of  
3 routers, said method further comprising detecting failure of  
4 a router within said tree before completing routing of said  
5 message to said one or more clients of said network,  
6 thereafter reconfiguring said tree to replace said failed  
7 router with a new router, and automatically generating a  
8 request for retransmission of said message from said  
9 persistent storage.

1 22. The method of claim 16, further comprising  
2 determining within said routing network whether said message  
3 comprises a duplicate message to said one or more clients of  
4 said network, and if so, aborting said duplicate message  
5 such that said message is delivered to said one or more  
6 clients at most once.

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The first step is to identify the key components of the system. This involves understanding the data sources, the processing logic, and the output requirements. Once these components are identified, the next step is to design a data model that can represent the information in a structured way. This model should be able to handle the various types of data and relationships between them.



1 24. A system of routing messages within a network,  
2 said system comprising:

3 means for receiving a message; and

4 means for routing said message to one or more  
5 clients of said network, said routing being based on  
6 data content of said message irrespective of any  
7 destination information that may be within said  
8 message, and wherein said means for routing is  
9 resilient to router or link failure within said  
10 network.

1 25. The system of claim 24, wherein said network  
2 comprises a publish/subscribe system supporting content-  
3 based subscription, and wherein said one or more clients  
4 comprise subscribers, with said message being received from  
5 a publisher.

1 26. The system of claim 25, wherein said means for  
2 routing comprises means for delivering said message to all  
3 subscribers requesting a uniform delivery quality of service  
4 or if unable to deliver said message to all of said  
5 subscribers requesting uniform delivery, for delivering said  
6 message to none of said subscribers requesting uniform  
7 delivery.

1 27. The system of claim 26, wherein said means for  
2 routing delivers said message to said subscribers requesting  
3 uniform deliver notwithstanding failure at one or more  
4 routers or links of said network, and wherein said system  
5 further comprises means for logging said message to  
6 persistent storage prior to delivery thereof to said  
7 subscribers requesting uniform delivery.



1 <sup>Sub</sup>32. The system of claim 24, wherein said network  
2 comprises a spanning tree and wherein said system further  
3 comprises a logger node within said spanning tree for  
4 logging said message to persistent storage during routing of  
5 said message to said one or more clients of said network.

1 33. The system of claim 24, wherein said means for  
2 routing comprises means for employing said logger node to  
3 log said message to persistent storage to ensure a uniform  
4 delivery quality of service of said message to said one or  
5 more clients of said network notwithstanding failure of one  
6 or more routers or links within said network.

1 34. The system of claim 24, wherein said network  
2 comprises a spanning tree having a plurality of routers, and  
3 further comprising means for detecting failure of a router  
4 within said tree before completing routing of said message  
5 to said one or more clients of said network, and means for  
6 reconfiguring said tree to replace said failed router with a  
7 new router, and means for automatically generating a request  
8 for retransmission of said message.

1 35. The system of claim 34, further comprising means  
2 for logging said message within persistent storage of said  
3 network and for issuing a logging acknowledgment confirming  
4 storage of said message to at least one router of said tree  
5 through which said message is routed to said one or more  
6 clients.

1 36. The system of claim 35, wherein said means for  
2 automatically generating a request for retransmission of  
3 said message comprises means for detecting a logging number  
4 associated with said message stored at one or more child  
5 routers of said new router.

1 ~~37. The system of claim 24, wherein said means for~~  
2 ~~routing further comprises means for determining within said~~  
3 ~~network whether said message comprises a duplicate message~~  
4 ~~to said one or more clients of said network, and if so, for~~  
5 ~~aborting said duplicate message such that said message is~~  
6 ~~delivered to said one or more clients at most once.~~

1 38. The system of claim 24, further comprising means  
2 for automatically informing a sender of said message when  
3 said message has been lost within said network to allow the  
4 sender to retransmit said message for routing to said one or  
5 more clients of said network so that said message is  
6 delivered at least once to said one or more clients.

1 39. A system of routing messages within a routing  
2 network, said system comprising:

3 means for receiving a message;

4 means for logging the message to persistent  
5 storage within the routing network; and

6 means for delivering said message to one or more  
7 clients of said network after said logging of said  
8 message to persistent storage, wherein said logging to  
9 persistent storage prior to delivery of said message to  
10 said one or more clients of said network provides  
11 resiliency to said routing notwithstanding router or  
12 link failure within said network.

1 40. The system of claim 39, wherein said means for  
2 logging comprises means for storing said message in said  
3 persistent storage at a logging node within said routing  
4 network before said delivery of said message to said one or  
5 more clients of said network.

1 41. The system of claim 40, further comprising means  
2 for sending a logging acknowledgment to at least one router  
3 of said network routing said message after said logging of  
4 said message to said persistent storage, and means for  
5 thereafter delivering said message to a client of said at  
6 least one router of said network routing said message, said  
7 client requiring uniform delivery and comprising one client  
8 of said one or more clients.

1 42. The system of claim 39, wherein said routing  
2 network comprises a spanning tree, and said means for  
3 logging comprises a logging node within said spanning tree  
4 for logging said message to persistent storage during  
5 routing of said message to said one or more clients of said  
6 network.

1 43. The system of claim 42, wherein said means for  
2 routing comprises means for employing said logging of said  
3 message to persistent storage to ensure a uniform delivery  
4 quality of service of said message to said one or more  
5 clients of said network notwithstanding failure of one or  
6 more routers or links within said network.

1 44. The system of claim 39, wherein said routing  
2 network comprises a spanning tree having a plurality of  
3 routers, and wherein said system further comprises means for  
4 detecting failure of a router within said tree before  
5 completing routing of said message to said one or more  
6 clients of said network, and for thereafter configuring said  
7 tree to replace said failed router with a new router, and  
8 for automatically generating a request for retransmission of  
9 said message from said persistent storage.

1 45. The system of claim 39, further comprising means  
2 for determining within said routing network whether said  
3 message comprises a duplicate message to said one or more  
4 clients of said network, and if so, for aborting said  
5 duplicate message such that said message is delivered to  
6 said one or more clients at most once.











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1 50. An article of manufacture, comprising:

2 at least one computer usable medium having  
3 computer readable program code means embodied therein  
4 for effecting routing of messages within a routing  
5 network, the computer readable program code means in  
6 the article of manufacture comprising:

7 computer readable program code means for  
8 causing a computer to effect receiving a message;

9 computer readable program code means for  
10 causing a computer to effect logging said message  
11 to persistent storage within the routing network;  
12 and

13 computer readable program code means for  
14 causing a computer to effect delivering said  
15 message to one or more clients of said network  
16 after said logging thereof, wherein said logging  
17 to persistent storage prior to delivery of said  
18 message to one or more clients of said network  
19 provides resiliency to said routing  
20 notwithstanding router or link failure within said  
21 network.

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